

AMENDMENTS TO AND LISTING OF THE CLAIMS

Please amend claims 1-5, cancel claims 6-36, and add new claims 37-39 as follows.

1. (Currently Amended) A hydraulic drive apparatus for driving and rotating a drive rotary member driven and rotated by hydraulic pressure [in accordance with an operation position input from operation position inputting means], the apparatus comprising:

[the drive rotary member driven and rotated by hydraulic pressure;]

a working oil supplying ~~means~~ unit for supplying working oil to drive and rotate the drive rotary member; and

a rotation control ~~means~~ unit for controlling a quantity of the working oil supplied from the working oil supplying ~~means~~ unit to the drive rotary member so that the drive rotary member is driven and rotated as desired, the rotation control ~~means~~ unit including:

an operation position inputting ~~means~~ unit for inputting an operation position;

an operation-position signal outputting ~~means~~ unit for generating and outputting an operation position signal depending on the operation position input by the operation position inputting ~~means~~ unit;

a drive signal outputting ~~means~~ unit for computing and converting the operation position signal output from the operation-position signal outputting ~~means~~ unit into a drive signal output therefrom;

an electric motor driven and rotated at a speed and a quantity of rotation depending on the drive signal output from the drive signal outputting ~~means~~ unit; and

a working oil control ~~means~~ unit for controlling a quantity of the working oil supplied from the working oil supplying ~~means~~ unit to the drive rotary member so that the drive rotary member is driven and rotated depending on rotation of the electric motor;

a drive oil pressure detecting ~~means~~ unit for detecting a pressure of the working oil for driving and rotating the drive rotary member, and generating and outputting a drive oil pressure signal depending on the pressure thus detected;

a supplying oil pressure detect ~~means~~ unit for detecting a pressure of the working oil supplied from the working oil supplying ~~means~~ unit to the working oil control ~~means~~ unit, and generating and outputting a supplying-oil pressure signal depending on the pressure thus detected;

~~a main relief valve for regulating a pressure of the working oil supplied from the working oil supplying means to the working oil control means to be equal to or lower than a set pressure;~~

~~an electromagnetic relief valve for varying the set pressure of the main relief valve by varying a set pressure thereof; and~~

a pump discharge pressure control unit for controlling a pressure of the working oil supplied from the working oil supplying unit to the working oil control unit to be equal to or lower than a set pressure;

an oil pressure control means unit for receiving the supplying-oil pressure signal output from the supplying oil detect means unit and the drive oil pressure signal output from the drive oil pressure detecting means unit, and outputting a current pressure signal to the ~~electromagnetic relief valve pump discharge pressure control unit to vary the set pressure of the electromagnetic relief valve and thus the set pressure of the main relief valve~~, thereby controlling the pressure of the working oil supplied from the working oil supplying means unit to be higher, by a predetermined pressure, than the pressure of the working oil for driving and rotating the drive rotary member;

a supplying oil quantity control unit for controlling a quantity of the working oil that the working oil supplying unit supplies; and

a supplying oil quantity signal outputting unit for receiving the operation position signal output from the operation position signal outputting unit, generating a supplying oil quantity signal from the operation position signal, and outputting the supplying oil quantity signal to the supplying oil quantity control unit, thereby controlling the quantity of the working oil supplied to the supplying oil quantity control unit by the working oil supplying unit.

2. (Currently Amended) A hydraulic drive apparatus for driving and rotating a drive rotary member driven and rotated by hydraulic pressure [in accordance with an operation position input from operation position inputting means], the apparatus comprising:

[the drive rotary member driven and rotated by hydraulic pressure;]

a working oil supplying means unit for supplying working oil to drive and rotate the drive rotary member; and

a rotation control ~~means~~ unit for controlling a quantity of the working oil supplied from the working oil supplying ~~means~~ unit to the drive rotary member so that the drive rotary member is driven and rotated as desired, the rotation control ~~means~~ unit including:

an operation position inputting ~~means~~ unit for inputting an operation position;

operation-position signal outputting ~~means~~ unit for generating and outputting an operation position signal depending on the operation position input by the operation position inputting ~~means~~ unit;

a drive signal outputting ~~means~~ unit for computing and converting the operation position signal output from the operation-position signal outputting ~~means~~ unit into a drive signal output therefrom;

an electric motor driven and rotated at a speed and a quantity of rotation depending on the drive signal output from the drive signal outputting ~~means~~ unit; and

a working oil control ~~means~~ unit for controlling a quantity of the working oil supplied from the working oil supplying ~~means~~ unit to the drive rotary member so that the drive rotary member is driven and rotated depending on rotation of the electric motor;

a drive oil pressure detecting ~~means~~ unit for detecting a pressure of the working oil for driving and rotating the drive rotary member, and generating and outputting a drive oil pressure signal depending on the pressure thus detected;

a supplying oil pressure detect ~~means~~ unit for detecting a pressure of the working oil supplied from the working oil supplying ~~means~~ unit to the working oil control ~~means~~ unit, and generating and outputting a supplying-oil pressure signal depending on the pressure thus detected;

a main relief valve for regulating a pressure of the working oil supplied from the working oil supplying ~~means~~ unit to the working oil control ~~means~~ unit to be equal to or lower than a set pressure;

an electromagnetic relief valve for varying the set pressure of the main relief valve by varying a set pressure thereof;

an oil pressure control ~~means~~ unit for receiving the supplying-oil pressure signal output from the supplying oil detect ~~means~~ unit and the drive oil pressure signal output from the drive oil pressure detecting ~~means~~ unit, and outputting a ~~current~~ position signal to the electromagnetic relief valve to vary the set pressure of the electromagnetic relief valve and thus

the set pressure of the main relief valve, thereby controlling the pressure of the working oil supplied from the working oil supplying ~~means~~ unit to be higher, by a predetermined pressure, than the pressure of the working oil for driving and rotating the drive rotary member;

a supplying oil quantity control ~~means~~ unit for controlling a quantity of the working oil that the working oil supplying ~~means~~ unit supplies; and

a supplying oil quantity signal outputting ~~means~~ unit for receiving the operation position signal output from the operation-position signal outputting ~~means~~ unit, generating a supplying oil quantity signal from the operation position signal, and outputting the supplying oil quantity signal to the supplying oil quantity control ~~means~~ unit, thereby controlling the quantity of the working oil supplied to the supplying oil quantity control ~~means~~ unit by the working oil supplying ~~means~~ unit.

3. (Currently Amended) A hydraulic drive apparatus according to claim 1, wherein the drive oil pressure detecting ~~means~~ unit includes a pressure gauge for detecting the pressure of the working oil supplied from the working oil control ~~means~~ unit to the drive rotary member, and another pressure gauge for detecting the pressure of the working oil supplied from the drive rotary member to the working oil control ~~means~~ unit.

4. (Currently Amended) A hydraulic drive apparatus for driving and rotating a drive rotary member driven and rotated by hydraulic pressure [in accordance with an operation position input from operation position inputting means], the apparatus comprising:

[the drive rotary member driven and rotated by hydraulic pressure;]

a working oil supplying ~~means~~ unit for supplying working oil to drive and rotate the drive rotary member; and

a rotation control ~~means~~ unit for controlling a quantity of the working oil supplied from the working oil supplying ~~means~~ unit to the drive rotary member so that the drive rotary member is driven and rotated as desired, the rotation control ~~means~~ unit including:

an operation position inputting ~~means~~ unit for inputting an operation position;

an operation-position signal outputting ~~means~~ unit for generating and outputting an operation position signal depending on the operation position input by the operation position inputting ~~means~~ unit;

a drive signal outputting ~~means~~ unit for computing and converting the operation position signal output from the operation-position signal outputting ~~means~~ unit into a drive signal output therefrom;

an electric motor driven and rotated at a speed and a quantity of rotation depending on the drive signal output from the drive signal outputting ~~means~~ unit; and

a working oil control ~~means~~ unit for controlling a quantity of the working oil supplied from the working oil supplying ~~means~~ unit to the drive rotary member so that the drive rotary member is driven and rotated depending on rotation of the electric motor;

a drive oil pressure detecting ~~means~~ unit for detecting a pressure of the working oil for driving and rotating the drive rotary member, and generating and outputting a drive oil pressure signal depending on the pressure thus detected;

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a supplying oil pressure detect ~~means~~ unit for detecting a pressure of the working oil supplied from the working oil supplying ~~means~~ unit to the working oil control ~~means~~ unit, and generating and outputting a supplying-oil pressure signal depending on the pressure thus detected;

a main relief valve for regulating a pressure of the working oil supplied from the working oil supplying ~~means~~ unit to the working oil control ~~means~~ unit to be equal to or lower than a set pressure;

an electromagnetic relief valve for varying the set pressure of the main relief valve by varying a set pressure thereof; and

an oil pressure control ~~means~~ unit for receiving the supplying-oil pressure signal output from the supplying oil detect ~~means~~ unit and the drive oil pressure signal output from the drive oil pressure detecting ~~means~~ unit, and outputting a ~~current~~ position signal to the electromagnetic relief valve to vary the set pressure of the electromagnetic relief valve and thus the set pressure of the main relief valve, thereby controlling the pressure of the working oil supplied from the working oil supplying ~~means~~ unit to be higher, by a predetermined pressure, than the pressure of the working oil for driving and rotating the drive rotary member,

wherein when the pressure of the working oil detected by the drive oil pressure detecting ~~means~~ unit is equal to or higher than a predetermined pressure, the oil pressure control ~~means~~ unit feeds ~~current~~ the position signal of a predetermined value to the electromagnetic relief valve.

5. (Currently Amended) A hydraulic drive apparatus according to claim 4, further comprising:

a check valve for preventing a reverse flow of the working oil when the working oil whose pressure is regulated to be equal to or lower than the set pressure by the main relief valve is supplied from the working oil supplying ~~means~~ unit to the working oil control ~~means~~ unit.

6. – 36. (Cancelled)

37. (New) A hydraulic driving apparatus according to claim 1, wherein said pump discharge pressure control unit comprises:

a main relief valve for regulating the pressure of the working oil supplied from the working oil supplying unit to the working oil control unit to be equal to or lower than a set pressure; and

an electromagnetic relief valve for varying the set pressure of the main relief valve by varying a set pressure thereof,

wherein the oil pressure control unit outputs the pressure signal to the electromagnetic relief valve to vary the set pressure of the electromagnetic relief valve and thus the set pressure of the main relief valve, thereby controlling the pressure of the working oil supplied from the working oil supplying unit to be higher, by a predetermined pressure, than the pressure of the working oil for driving and rotating the drive rotary member.

38. (New) A hydraulic driving apparatus comprising:

a drive rotary member (43) driven by hydraulic pressure;

a pump (42) for supplying working oil;

a working oil control unit (25) connecting the pump (42) to the drive rotary member (43) with oil passages, controlling a quantity of the working oil supplied from the pump (42) to the drive rotary member (43);

an operation position inputting unit (21) for inputting an operation position;

an operation position signal outputting unit (22) for outputting an operation position signal according to the operation position input by the operation position inputting unit (21);

an electric motor (24) electrically connected to a drive signal outputting unit (23A) and operatively coupled with the working oil control unit (25), thereby being driven at a

predetermined speed or quantity of rotation according to the drive signal output from the drive signal outputting unit (23A);

a pump discharge pressure control unit (45, 46) electrically connected to an oil pressure control unit (23B) and operatively coupled to the pump (43), controlling a pressure of the working oil discharged from the pump;

a supplying oil quantity control unit (51) electrically connected to a supplying oil quantity signal outputting unit (23C) and operatively coupled with the pump for controlling a quantity of the working oil that the pump (42) supplies;

a supplying oil pressure detect unit (49) in communication with a first oil passage (63) connecting the pump to the working oil control unit (25), the supplying oil pressure detect unit (49) detecting a pressure of the working oil supplied from the pump (42) to the working oil control unit (25), and outputting a supplying-oil pressure signal to the oil pressure control unit (23B);

a drive oil pressure detecting unit (47, 48) in communication with a second oil passage (64, 65) connecting the working oil control unit to the drive rotary member (43), the drive oil pressure detecting unit detecting a pressure of the working oil for driving the drive rotary member (43), and generating and outputting a drive oil pressure signal to the oil pressure control unit (23B);

wherein the drive signal outputting unit (23A) computes and converts the operation position signal output from the operation-position signal outputting unit (22) into a drive signal output therefrom;

wherein the oil pressure control unit (23B) receives the supplying-oil pressure signal output from the supplying oil detect unit (49) and the drive oil pressure signal output from the drive oil pressure detecting unit (47, 48), and outputs a pressure signal to the pump discharge pressure control unit (45, 46), so that a pressure of the working oil supplied from the pump (42) is controlled to be higher, by a predetermined pressure, than the pressure of the working oil for driving the drive rotary member (43); and

wherein the supplying oil quantity signal outputting unit (23C) receives the operation signal output from the operation-position signal outputting unit (22), and outputs a supplying oil quantity signal to the supplying oil quantity control unit (51), corresponding to a quantity of the working oil that the pump (42) supplies.

39. (New) A hydraulic driving apparatus according to claim 38, wherein said pump discharge pressure control unit comprises:

a main relief valve for regulating the pressure of the working oil supplied from the working oil supplying unit to the working oil control unit to be equal to or lower than a set pressure; and

an electromagnetic relief valve for varying the set pressure of the main relief valve by varying a set pressure thereof,

wherein the oil pressure control unit outputs the pressure signal to the electromagnetic relief valve to vary the set pressure of the electromagnetic relief valve and thus the set pressure of the main relief valve, thereby controlling the pressure of the working oil supplied from the working oil supplying unit to be higher, by a predetermined pressure, than the pressure of the working oil for driving and rotating the drive rotary member.
